Psychotria kosraensis (Rubiaceae), a New Species from Kosrae, Caroline Islands, Micronesia

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ABSTRACT. *Psychotria kosraensis* Lorence & K. R. Wood (Rubiaceae, Rubioideae), a narrow endemic from Kosrae, Caroline Islands, Federated States of Micronesia (FSM), is described and illustrated. The new species differs from other known species of *Psychotria* L. in Micronesia by its combination of narrowly obovate-elliptic or narrowly elliptic leaves with long-acuminate apex and abaxially barbate leaf axils, pseudoaxillary fasciculate inflorescences with very short peduncles ca. 1 mm, flowers with a long calyx tube with narrowly triangular lobes, and villosulous fruits crowned with the persistent well-developed calyx tube and lobes. Known from a single population of five individuals, *P. kosraensis* easily falls into the IUCN Red List category of Critically Endangered (CR).

Key words: Federated States of Micronesia, IUCN Red List, Kosrae, *Psychotria*, Rubiaceae.

Kosrae (formerly known as Kusaie or Kusae) is located in the eastern Caroline Islands at 5°20′N longitude and 163°0′E latitude (Fig. 1). It is one of four states comprising the Federated States of Micronesia (FSM). This volcanic high island covers an area of ca. 110 km² (41.7 sq. mi.) and rises to an elevation of ca. 634 m (2080 ft.) at Mt. Finkol. The oldest rocks from Kosrae date to ca. 2.6 Ma (Duncan & Clague, 1985). No checklist or flora of Kosrae exists, although Fosberg and collaborators have published checklists of Micronesian plant groups (Fosberg et al., 1979, 1982, 1987) and five fascicles of an incomplete *Flora of Micronesia* (Fosberg & Sachet, 1975a, 1975b, 1977, 1980a; Fosberg et al., 1993). Recent botanical inventory work conducted on Kosrae by staff of the National Tropical Botanical Garden, The New York Botanical Garden, and the Kosrae Conservation and Safety Organization (KCSO) has increased our knowledge of the island's flora, including numerous island records of native and introduced species and a comprehensive checklist currently in preparation. This work has resulted in the discovery of the following new species of *Psychotria* L., which is described below.

Psychotria kosraensis Lorence & K. R. Wood, sp. nov. TYPE: Federated States of Micronesia. Caroline Islands: Kosrae, Lelu Municipality, Finol (Mt.) Mutunte, NE slopes, 520 m, 6 Feb. 2010, *K. R. Wood, W. Law, C. Cianchini & J. Sanney 14132* (holotype, PTBG-051673 [inflor., fl. in packet]; isotypes, MO [fr.], NY [fr.], PTBG-051672 [st., note stipule], US [buds]). Figure 2.

Haec species a congeneris micronesianis foliis anguste obovato-ellipticis vel anguste ellipticis apice longe acuminatis abaxialiter ad axillas venarum secundariarum barbatis, stipulis vaginantibus tubularibus caducis vagina 30–35 mm longa ac lobis bifidis, inflorescentia condensata pseudoaxillari 3- ad 9-flora pedunculo ca. 1 mm longo insidente atque fructu (immaturo) ellipsoideo villosulo 5–5.5 mm longo 3–3.5 mm diam., calycis tubo 1.7–1.8 mm longo ac lobis anguste triangularibus 1.2–1.8 mm longis coronato distinguitur.

Small trees 1–2 m tall, moderately branched, leafy stems dark brown with red-brown tinge, 2.5–3.5 mm diam., compressed, glabrous except for ring of reddish brown colleters at stipule scars, internodes 1.5–3.5 cm. Leaves with the blade narrowly obovate-elliptic to narrowly elliptic, (9–)16–19 × (3–)3.7–5.3 cm, when fresh, blades glossy dark green with secondary veins impressed, paler beneath, drying green or brownish green with costa and veins stramineous, base narrowly cuneate, apex long-acuminate, secondary veins in 12 to 14 pairs, festooned brochidodromous, barbate in axils abaxially with brown trichomes, margins plane; petioles 1.5–2.2 cm, 1–1.3 mm diam., glabrous; stipules cylindrical-sheathing, thin, brown, glabrous, splitting down one side and soon deciduous; sheath 30–35 mm, 4 mm diam., apex bilobed with lobes 10–12 mm, each lobe deeply bifid for 5–6 mm. Inflorescence apparently terminal but soon becoming pseudoaxillary by displacement, at first enclosed by a caducous stipule-like bract, fasciculate, 3- to 9-flowered, subsessile or the peduncle to 1 mm, subtended by 1 or 2 bracts ca. 4 mm with apex acuminate. Flowers on villosulous pedicels ca. 1 mm, 0.5–0.7 mm diam., hypanthium obconic, 1–1.2 mm, villosulous; calyx tube 1.7–1.8 mm, obconic, glabrous externally, calyx lobes 5, narrowly triangular, 1.2–1.8

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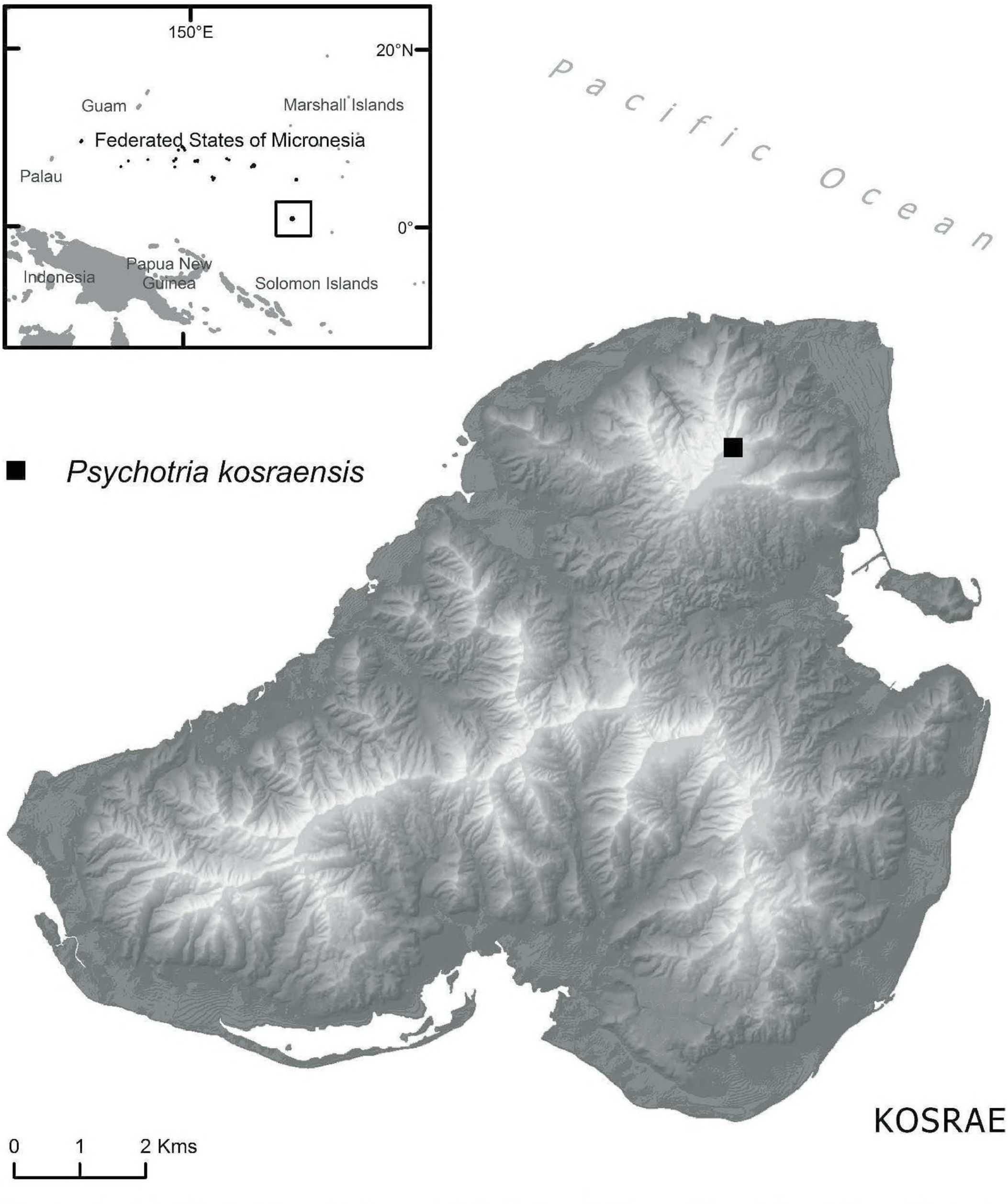

Figure 1. Location of *Psychotria kosraensis* Lorence & K. R. Wood on Mt. Mutunte, Kosrae, Federated States of Micronesia.

× 0.5–0.7 mm, apex acute; corolla white, funnelform, externally glabrous, internally villous in throat, tube 5–6 mm, lobes 4.5–5 × 1.2–1.3 mm, recurved; stamens partly exserted, filaments 2 mm, anthers ellipsoid, 2 mm, style 10 mm, exserted, glabrous, stigma bilobed, lobes 0.7 mm, papillose. Fruits (immature) light green, ellipsoid, 5–5.5 × 3–3.5 mm, villosulous, dorsally ribbed, crowned by persistent calyx; pyrenes not seen.

Distribution, habitat, and phenology. *Psychotria kosraensis* is known only from the steep upper northeastern slopes of Mt. Mutunte in the Lelu Municipality of northern Kosrae at 520 m. This habitat is low-elevational cloud forest rich with terrestrial and epiphytic bryophytes and a closed canopy of trees and shrubs. Associates include *Polyscias subcapitata* Kaneh. (Araliaceae), *Ponapea ledermanniana* Becc. (Arecaceae), *Elaeocarpus carolinensis* Koidz. and *E.*

Figure 2. Holotype of *Psychotria kosraensis* Lorence & K. R. Wood, showing branch with terminal inflorescence and dissected flower (*Wood et al. 14132*, PTBG).

kusaiensis Kaneh. (Elaeocarpaceae), *Flagellaria indica* L. (Flagellariaceae), *Cyrtandra kusaimontana* Hosok. and *C. urvillei* C. B. Clarke (Gesneriaceae), *Neuburgia celebica* (Koord.) Leenh. (Loganiaceae), *Astronidium carolinense* (Kaneh.) Markgr., *Medinilla diversifolia* Kaneh., and *Melastoma malabathricum* L. (Melastomataceae), *Ficus virens* Aiton (Moraceae), *Horsfieldia irya* (Gaertn.) Warb. (Myristicaceae), *Pandanus kusai-*

colus Kaneh. and the woody climber *Freycinetia ponapensis* Martelli (Pandanaceae), *Ixora casei* Hance, *Psychotria hombroniana* (Baill.) Fosberg, and *P. rhombocarpa* Kaneh. (Rubiaceae), *Planchonella micronesica* (Kaneh.) Kaneh. ex H. J. Lam (Sapotaceae), and *Boehmeria virgata* (G. Forst.) Guill. and *Pipturus argenteus* (G. Forst.) Wedd. (Urticaceae). The lower stratum and ground flora include sedges such as *Hypolytrum dissitiflorum* Steud. and *Mapania pandanophylla* (F. Muell.) K. Schum. subsp. *immensa* (Kük.) T. Koyama (Cyperaceae) and numerous ferns and lycophytes including *Asplenium robustum* Blume and *A. pellucidum* Lam. (Aspleniaceae), *Sphaeropteris lunulata* (Forst.) R. M. Tryon and *S. nigricans* (Mett.) R. M. Tryon (Cyatheaceae), *Davallia solida* (G. Forst.) Sw. and *D. repens* (L. f.) Kuhn (Davalliaceae), *Histiopteris incisa* (Thunb.) J. Sm. (Dennstaedtiaceae), *Bolbitis heteroclita* (C. Presl) Ching, *Dryopteris hasseltii* (Blume) C. Chr., and *Elaphoglossum carolinense* Hosok. (Dryopteridaceae), *Huperzia phlegmaria* (L.) Rothm. (Lycopodiaceae), *Angiopteris evecta* (G. Forst.) Hoffm. (Marattiaceae), *Pteris pacifica* Hieron. (Pteridaceae), *Tectaria grandifolia* (Pr.) Copel. (Tectariaceae), *Cyclosorus heterocarpus* (Blume) Ching (Thelypteridaceae), and *Diplazium melanocaulon* Brack. (Woodsiaceae).

Two of the five known trees of *Psychotria kosraensis* were observed in early flower and fruit in February 2010 but were sterile in September 2011.

IUCN Red List Category. When evaluated using the World Conservation Union (IUCN) criteria for endangerment (IUCN, 2001), *Psychotria kosraensis* falls into the Critically Endangered (CR) category, which designates this species as facing the highest risk of extinction in the wild: B1ab(v); B2a, B2b(i–iii); D: B1, extent of occurrence less than 100 km^2, B1a, known to exist at only a single location, B1b(v), continuing decline inferred in a number of mature individuals; B2, total area of occupancy less than 10 km^2; B2a, one population known; B2b(i–iii), habitat continuing decline inferred; D, population estimated to number fewer than 50 individuals. Threats to *P. kosraensis* include habitat degradation and destruction by pigs (*Sus scrofa* L.); predation of seeds by rats (*Rattus* Fischer); possible extinction as a result of natural catastrophes through environmental events (e.g., large fallen limbs that crush understory species, fires, flash floods, landslides); competition with invasive non-native plant taxa in the immediate area such as *Rubus moluccanus* L. and *Paspalum conjugatum* P. J. Bergius, in addition to ingress of the smothering vine *Merremia peltata* (L.) Merr. from lower elevations; and reduced reproductive vigor as the result of its limited population size.

Etymology. *Psychotria kosraensis* is named for the island of Kosrae where the type specimen was collected and the only known plants occur.

Discussion. Collections from Mt. Mutunte do not correspond with any previously described *Psychotria* species based on reviews of the Micronesian *Psychotria* by Fosberg and Sachet (1980a, 1980b, 1991) and comparison with specimens from other Pacific islands housed at BISH, PTBG, and US. Its caducous tubular-sheathing stipules that leave a ring of reddish brown colleters at stipule scars, as well as its floral and fruit morphologies, place it in subgenus *Psychotria* L. along with many other Polynesian and Micronesian congeners. For a more detailed discussion of *Psychotria* systematics, see Nepokroeff et al. (1999) and Lorence and Wagner (2005). This new species differs from other Micronesian members of the genus by its combination of narrowly obovate-elliptic to narrowly elliptic leaves with an acuminate apex, bifid stipule lobes, abaxially barbate leaf axils, pseudoaxillary fasciculate inflorescences, very short peduncles ca. 1 mm long, flowers with a long calyx tube with dentate lobes, and villosulous fruits crowned with the persistent well-developed calyx tube and lobes.

When following Fosberg and Sachet's (1991) key to the Micronesian *Psychotria* species, *P. kosraensis* keys most closely to *P. merrillii* Kaneh., a species endemic to the neighboring island of Pohnpei. Besides the previously mentioned distinctions, *P. kosraensis* differs conspicuously from *P. merrillii* by its narrowly obovate-elliptic to narrowly elliptic leaf blades with a long-acuminate apex, flowers on short pedicels ca. 1 mm, a much larger calyx tube 1.7–1.8 mm with lobes 1.2–1.8 mm, and larger corollas with the tube 5–6 mm and lobes 4.5–5 mm. *Psychotria merrillii*, in comparison, has broadly obovate-elliptic to occasionally broadly elliptic leaf blades with a bluntly short-acuminate apex, flowers on longer, more slender pedicels 7–10 mm, much smaller calyces with tubes 0.5–0.6 mm and minute lobes only 0.1 mm, and smaller corollas with the tube 1.5–3.5 mm and lobes 2.5–4.5 mm. Based on its vegetative morphology and short terminal inflorescences with strongly ascending pedicels, the new species resembles the poorly known *P. hosokawae* Fosberg, also endemic to Kosrae but known only from the immature flowering type collection (*Hosokawa 8775*, A). However, the latter species differs in having apparently calyptrate stipules and non-barbate leaf axils, an inflorescence composed of five once- or twice-branched cymes 2 cm, a very short scarcely lobed, ringlike calyx, and smaller corollas only ca. 3 mm in bud (Fosberg & Sachet, 1991). With the

inclusion of this new species, the *Psychotria* species in Kosrae can be separated using the modified key of Fosberg and Sachet (1991) as follows. Both *P. hombroniana* and *P. rhombocarpa* are distylous (Lorence, unpublished). However, the breeding system is uncertain for *P. kosraensis*, which is known only from a single (apparently long-styled) flowering collection and unknown in *P. hosokawae*, which is known only from a single collection with immature flowers.

KEY TO THE SPECIES OF *PSYCHOTRIA* IN KOSRAE

1a. Peduncles (primary inflorescence axis) up to 1 mm; calyx cylindrical, tube well-developed, 1.7–1.8 mm, and lobes 1.2–1.8 mm ..... *P. kosraensis*
1b. Peduncles (primary inflorescence axis) 10 mm or longer; calyx ringlike or cup-shaped, tube <1.7 mm, and lobes 0.1–0.5 mm.
  2a. Leaves <10(–14) × 3(–5) cm; inflorescences axillary filiform cymes, peduncles <0.5 mm diam. ..... *P. hombroniana*
  2b. Leaves >15 × 5 cm; inflorescences terminal branched cymes or panicles, peduncles 1.5–2 mm diam.
    3a. Leaves to 19 × 5 cm; inflorescences a cluster of 5 once- or twice-branched cymes 20 mm, short pedunculate with peduncles to 10 mm, flowers on strongly ascending pedicels to 5 mm .... *P. hosokawae*
    3b. Leaves to 25 × 9 cm; inflorescences a thyrsoid panicle with 4 to 5 pairs of secondary branches, long pedunculate with peduncles 40–70(–90) mm, flowers subsessile or pedicels 0.3–1 mm .... *P. rhombocarpa*

Paratype. FEDERATED STATES OF MICRONESIA. **Caroline Islands:** Kosrae, Lelu Municipality, Mt. Mutunte, NE slopes, *K. R. Wood, W. Law, C. Cianchini & J. Sanney 14778* (PTBG).

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